Argument saturation and intransitive modification: The double life of embedded clauses

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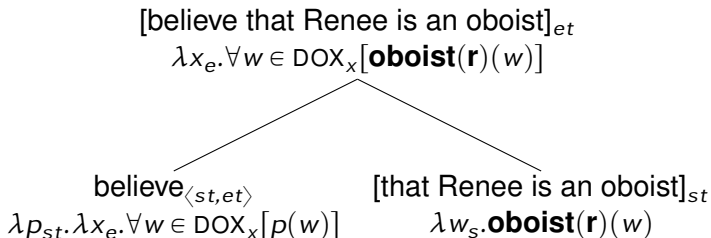Slides: tinyurl.com/embeddedclauses

Introduction

Setting the stage

There is considerable debate on how attitude verbs compose with embedded clauses.

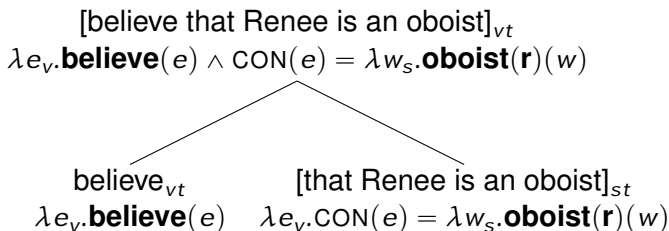(1)   Joaquin believes [that Renee is an oboist]$_{CP}$

One end of the spectrum

The traditional view: clauses are semantic **arguments** and compose via Function Application (FA), à la Heim & Kratzer (1998)

$$[\text{believe that Renee is an oboist}]_{et}$$
$$\lambda x_e.\forall w \in \text{DOX}_x[\textbf{oboist}(\textbf{r})(w)]$$

believe$_{\langle st,et\rangle}$ $[\text{that Renee is an oboist}]_{st}$
$\lambda p_{st}.\lambda x_e.\forall w \in \text{DOX}_x[p(w)]$ $\lambda w_s.\textbf{oboist}(\textbf{r})(w)$

The other end

A newer view: clauses are verbal **modifiers** and compose intersectively via some flavor of Predicate Modification (PM) (Kratzer 2006, Moulton 2015, Elliott 2017, a.o.)

[believe that Renee is an oboist]$_{vt}$
$\lambda e_v.\textbf{believe}(e) \wedge \text{CON}(e) = \lambda w_s.\textbf{oboist}(\mathbf{r})(w)$

believe$_{vt}$ [that Renee is an oboist]$_{st}$
$\lambda e_v.\textbf{believe}(e)$ $\lambda e_v.\text{CON}(e) = \lambda w_s.\textbf{oboist}(\mathbf{r})(w)$

(Modulo differing treatments of neo-Davidsonian event arguments)

A complication

Many English attitude verbs can also take non-clausal complements, like 'content' nominals (DPs which can optionally compose with a CP):

(2)   Lucretia believes/denies/confronts [the rumor/claim/story/lie (that she is Elena Ferrante)]$_{DP}$.

A subset of these verbs can also take non-content DPs as objects:

(3)   Lucretia believes the seer/the book/Maude.
       ≈ Lucretia believes {the seer/the book/Maude}**'s claim**

And crucially, what appears to be embedded CPs can also occur following the object in cases like (3):

(4)   Lucretia believes [the seer]$_{DP}$ [that she will inherit a great fortune]$_{CP}$.

Beyond *believe*

These V-DP-CP sequences are puzzling: both the DP and the CP seem to describe, in some way, the content of the attitude.

The verbs which permit non-content DP + CP combos of this sort correspond to some broad semantic classes:

- Verbs of (anti-)credulity: *believe*, *trust*, *challenge*, *dispute*...
- Verbs of (anti-)comprehension: *(mis)understand*, *get*, *comprehend*, *grok*...
- Verbs of (anti-)validation: *fact-check*, *corroborate*, *contradict*...

(5)   He corroborated the mechanic that she was nowhere near the scene of the accident.

I consider primarily *believe* in this talk.

This talk

Big question: What can verbs which 'take' both a DP and a CP at the same time tell us about composition with embedded clauses?

Proposal

Embedded *that*-clauses are flexibly-typed and can function as arguments of transitive predicates or modifiers of intransitive ones, **or transitive predicates with a filled argument slot**

Upshot: There are multiple routes to composing verbs with embedded clauses (cf. Özyıldız 2020), even for the same verb in the same language.

The puzzle

Syntax

The DP in the V-DP-CP construction always precedes the CP:

(6) a. She trusts [the reporter]$_{DP}$ [that it will snow tomorrow]$_{CP}$.
     b. *She trusts [that it will snow tomorrow]$_{CP}$ [the reporter]$_{DP}$.

Stacking 2 DPs or 2 CPs is also ruled out:

(7) a. *She trusts [the reporter]$_{DP}$ [the rumor]$_{DP}$.
     b. *She trusts [that it will snow tomorrow]$_{CP}$ [that today is
         Saturday.]

Syntax

When the DP is non-content-denoting, the postverbal DP and the CP cannot form a constituent:

(8)   *Fragment Answer*
      A: What/who does Lucretia believe?
      B: *Maude/the book that it's raining.

(9)   *Clefting*
      *It is Maude/the book that it's raining that Lucretia believes.

(10) *Pseudoclefting*
      *Maude/the book that it's raining is what Lucretia believes.

⋆ The most plausible analysis, on its face: the CP does not compose directly with the verb

Comparison with content nominals

Recent evidence has pointed to content DPs composing with clauses intersectively (Kratzer 2006, Moulton 2009, 2015)

(11)   the claim that it's raining
         $\iota x_e[\textbf{claim}(x) \wedge \text{CON}(x) = \lambda w_s.\textbf{rain}(w)]$

The CP in V-DP-CP has a similar distribution to the CP taken by content DPs, and a different distribution from the P in V-CP sequences.

Comparison with content nominals

CP proforms (Moulton 2015):

(12)   a.   Hobart believes so/it/that.
        b.   *Hobart's belief so/it/that
        c.   *Hobart believes Mildred so/it/that.

About-**PPs** (Rawlins 2013):

(13)   a.   *Hobart believes about the rain.
        b.   Hobart's belief about the rain.
        c.   Hobart believes Mildred about the rain.

Obligatory overt C:

(14)   a.   Hobart believes (that) it's raining.
        b.   Hobart's belief *(that) it's raining
        c.   Hobart believes Mildred *(that) it's raining.

Islandhood

The CP in V-DP-CP constructions is also an island; this is not so if the
DP is absent.

Object DPs block A' extraction from the embedded CP

(15)   a.   What$_i$ do you believe (??Maude) that she ate t_i?
       b.   [the kiwi]$_i$ that Hugh believes (*Maude) that she ate t_i

$\rightarrow$ This suggests this CP is not in a syntactic argument position.

Semantics

(16)   Lucretia believes [the seer]$_{DP}$ [that she will receive a great
         fortune]$_{CP}$.

Roughly, (16) communicates:

- The seer claimed that L will receive a great fortune
- L believes that she will receive a great fortune
- L believes the above **on the basis of that claim**

More generally, the object DP somehow receives a 'content'
interpretation whose content coincides with that of the belief.

The persistence of claims

To *believe* an animate DP in fact **presupposes** that the DP made a claim of some kind.

(17)   **Context**: Anders made no claims about anything.
   a. #Beryl believes Anders.
   b. #Beryl doesn't believe Anders.
   c. #Does Beryl believe Anders?
   d. #Maybe Beryl believes Anders.

Beyond claims

'Claims' also need not be speech acts. The object of DP can also be a depictive media artifact, such as *recording* and *photograph*:

(18)   a.   The jury believed the photograph that the defendant is guilty.
       b.   I trust the recording that there is a grand conspiracy.

In these cases, however, the general contour is the same: the DP stands in for a contentful entity, and the CP describes the content of the attitude.

Summing up

The CP in V-DP-CP constructions has a largely 'peripheral' status:

- It does not compose with the verb directly
- It has the external distributional of a semantic modifier
- It is an (adjunct)-island
- It is optional

...all ways it is *unlike* the embedded CP when the object DP is not present with the same V.

Analysis

Analytical desiderata

Empirically, we want the compositional meaning of *believe DP* to have three things:

- A presupposition that the DP made a claim with particular (propositional) content
- This proposition can be made explicit with the following CP
- The subject believes this proposition on the basis of that claim.

Preview

In *believe-DP-CP*, the DP is a thematic argument of *believe* while the CP restricts the content of the believing eventuality.

This is achieved via a type asymmetry between *that*-clauses and contentful individuals:

- (Content) DPs denote **contentful individuals** and compose via FA
- *That*-clauses denote **predicates of eventualities** and compose via PM

Believe DP that CP constructions have the following LF:

(19)

believe   Mildred   that it's raining
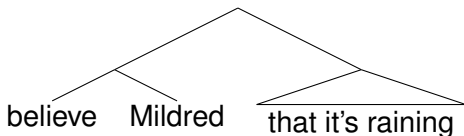
The meaning of *believe*

I propose that *believe* denotes a Kratzer (1996)-style function from contentful individuals to properties of eventualities (type $\langle e, vt \rangle$):

(20) $\llbracket believe \rrbracket = \lambda x_c \lambda e_v.\textbf{believe}(e) \wedge \mathscr{F}_{cont}(x) = \mathscr{F}_{cont}((e))$

Believe takes a contentful individual x_c ($D_c \subseteq D_e$), and equates its content to that of a believing eventuality.

This is a departure from a more total neo-Davidsonian approach to lexical semantics, whereby all arguments are severed from the verb (e.g. Elliott 2017)

Extracting content from individuals

A non-content DP like *Maude* cannot saturate the individual argument of *believe* on its own.

We need a mechanism to turn it into a contentful individual of the relevant sort, which I cash out with the operator CLAIM, inspired by Uegaki (2016):

(21) $[\![\text{CLAIM}]\!]^w = \lambda y_e.\iota x_c[\mathscr{F}_{cont}(x_c)(w) = \mathscr{F}_{cont}(\textbf{claim}(y)(w))]$

CLAIM denotes a function from individuals to the unique contentful individual with the same content as their claim* in w

CLAIM must also presuppose the *existence* of a claim, though I will leave that out of composition here.
*broadly construed

Composing with the CP

I assume that *that*-clauses denote predicates of eventualities (Rawlins 2013):

(22) $[\![\text{that it's raining}]\!]^w = \lambda e_v . \mathscr{F}_{cont}(e)(w) = \lambda w'_s . \textbf{rain}(w')$

Because *that*-clauses and *believe DP* denote the same type of formal object, they must compose intersectively, via a mechanism like Restrict (Chung & Ladusaw 2004):
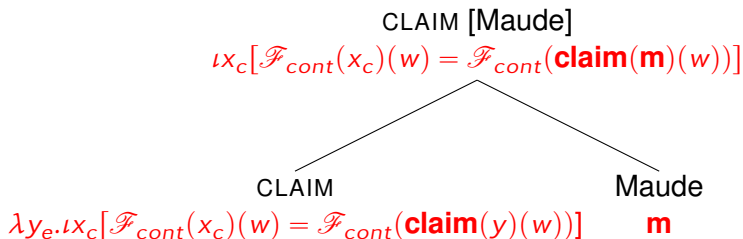
(23)   For type α and type β such that $\beta = \langle \beta_1 \langle ... \langle \beta_n t \rangle \rangle \rangle$ for some $n \geqslant 0$,
$Restrict(A_{\langle \alpha\beta \rangle}, B_{\langle \alpha t \rangle}) = \lambda x \in D_\alpha . \lambda y_1 \in D_\beta ... \lambda y_n \in D_\beta . A(x)(y_1)...(y_n) \wedge B(x)$
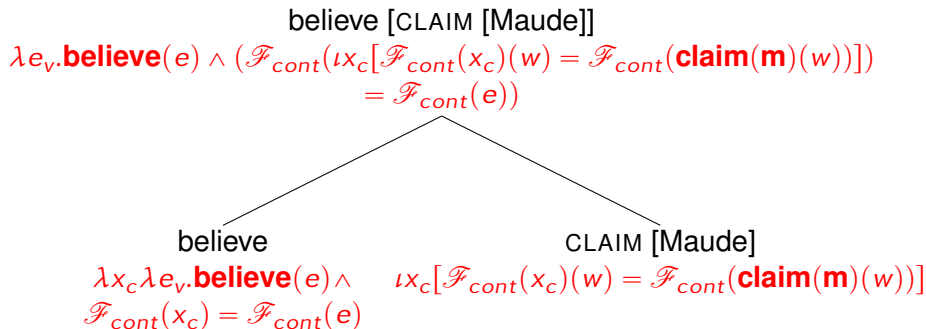
Putting the pieces together

Now we can compose *believe Maude that it's raining*:

Step 1: Compose *Maude* with CLAIM via FA

CLAIM [Maude]
$$\iota x_c[\mathscr{F}_{cont}(x_c)(w) = \mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w))]$$

CLAIM
$$\lambda y_e.\iota x_c[\mathscr{F}_{cont}(x_c)(w) = \mathscr{F}_{cont}(\textbf{claim}(y)(w))]$$

Maude
$$\textbf{m}$$

Putting the pieces together

Step 2: Compose the CLAIM-DP with *believe* via FA

believe [CLAIM [Maude]]

$\lambda e_v.\textbf{believe}(e) \wedge (\mathscr{F}_{cont}(\iota x_c[\mathscr{F}_{cont}(x_c)(w) = \mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w))])$
$= \mathscr{F}_{cont}(e))$

believe

$\lambda x_c \lambda e_v.\textbf{believe}(e) \wedge$
$\mathscr{F}_{cont}(x_c) = \mathscr{F}_{cont}(e)$

CLAIM [Maude]

$\iota x_c[\mathscr{F}_{cont}(x_c)(w) = \mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w))]$

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Putting the pieces together

Step 3: Compose *believe*+CLAIM-DP with the embedded CP via Restrict.

believe [CLAIM [Maude]] that it's raining
$$\lambda e_v.\textbf{believe}(e) \wedge$$
$$(\mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w)) = \mathscr{F}_{cont}(e)) \wedge \mathscr{F}_{cont}(e) = \lambda w_s'.\textbf{rain}(w')$$

believe [[CLAIM] Maude]
$$\lambda e_v.\textbf{believe}(e) \wedge$$
$$(\mathscr{F}_{cont}(\textbf{claim}(\textbf{m})(w)) = \mathscr{F}_{cont}(e))$$

that it's raining
$$\lambda e_v.\mathscr{F}_{cont}(e) = \lambda w_s'.\textbf{rain}(w')$$

Extensions and consequences

When clauses are arguments

A problem: sentences with an embedded *that*-clause and no DP:

(24)   Lucretia believes that it's raining.

This composition cannot proceed because of the type mismatch between *believe* ($\langle e, vt \rangle$) and the *that*-clause (vt)

Solution: Permit *that*-clauses to be coerced into contentful individuals so that they may saturate verbal arguments

Coercing *that*-clauses

There is a close kinship between eventualities and contentful individuals; many authors treat the former as a subset of the latter (Lasersohn 1995, Hacquard 2006, Elliott 2017).

I leave them typewise distinct, but propose that *that*-clauses can be flexibly coerced into a unique contentful individual.

(25) $[\![$that it's raining$]\!] = \iota x_c[\mathscr{F}_{cont}(x_c) = \lambda w_s.\textbf{rain}(w)]$

(26)   believes that it's raining
         $\lambda e_v.\textbf{believe}(e) \wedge \mathscr{F}_{cont}(e) = \mathscr{F}_{cont}(\iota x_c[\mathscr{F}_{cont}(x_c) = \lambda w_s.\textbf{rain}(w)])$

Note that a content DP could not modify (26), because there is an irreconcilable type mismatch.

Coercing *that*-clauses

This possibility is independently motivated for 'nominalized' *that*-clauses, which can be 'equated' with content DPs (Potts 2002):

(27)   The fact/Flo's claim is that it's raining.

The idea: content DPs and *that*-CPs in these cases denote the same kind of object.

Why not treat all embedded CPs as modifiers?

It's recently been argued that verb-embedded (*that-*)clauses should be generally treated as modifiers across the board, and that attitude verbs all denote predicates of contentful individuals (Kratzer 2006, Moulton 2009, 2015, Elliott 2017)

If this is the case, it is not clear why some verbs, like *think*, can embed clauses but not (content) DPs:

(28)   a.   Lorraine thinks that it's raining.
       b.   *Lorraine thinks Barney/the rumor.

On the present account, this can be explained if *think* lacks a content argument but retains an event argument:

(29) $\llbracket \text{think} \rrbracket = \lambda e_v.\textbf{think}(e)$

Why not treat all embedded CPs as modifiers?

This tracks with the observation that *think* is intransitive, unlike *believe*:

(30)   Lorraine thinks/*believes.

Think is also like content nominals in that in can compose with an *about*-PP, expected if *about*-PPs denote predicates of eventualities (Rawlins 2013):

(31)   Lorraine thought about Barney.

Why can't CPs be stacked?

Given that a CP can denote an argument or a modifier of *believe*, we need an explanation for why we can't stack CPs:

(32)   *Mathison believes [that Ulysses is in Moldova]$_{CP}$ [that it's raining ice cream]$_{CP}$.

This yields the denotation below:

(33) $\lambda e_v.\textbf{believe}(e) \wedge (\mathscr{F}_{cont}(e) = \lambda w_s.\textbf{in-Moldova}(\textbf{u})(w)) \wedge (\mathscr{F}_{cont}(e) = \lambda w_s.\textbf{rain-ice-cream}(w))$

Assuming that e corresponds to a single believing eventuality (Elliott 2017), it has incoherent content corresponding to two different propositions.

Conclusion

Wrapping up

I've proposed that embedded *that*-clauses live a double life:

- They can **denote contentful individuals** and saturate content arguments of transitive predicates...
- ...or **denote predicates of eventualities** and modify event arguments of intransitive predicates.

This compositional flexibility is achieved by allowing *that*-clauses a degree of denotational flexibility.

Looking ahead

Much remains to be understood, however:

- Given the semantic generalizations among verbs which permit V-DP-CP, what implications are there for the lexical semantics-syntax interface?
- Are there clear interpretive differences when a CP denotes an individual vs. a predicate of eventualities?
- There needs to be some restrictions on where CLAIM-DPs show up. For instance, some verbs which can embed content nouns cannot take CLAIM-DPs. Why?

(34) a. Sandra denied the rumor.
      b. *Sandra denied John. ($\approx$Sandra denied John's claim.)

Thank you! Merci!

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